

LEJEUNEACEAE (HEPATICAE) OF VICTORIA; ADDITIONS AND A RESTITUTION.

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CARR, DENIS J., 2004:12:04. Lejeuneaceae (Hepaticae) of Victoria; Additions and a restitution. *Proceedings of the Royal Society of Victoria* 116(2): 221-232. ISSN 0035-9211.

Six species of the genus *Lejeunea* are described from specimens collected in various Victorian localities during the mid 1950s. One, *L. fawcettiae* is new to Science and as far as is known, endemic to the State. An additional species, hitherto unknown to mainland Victoria is described and restored to its former subgeneric status. It is *Microlejeunea primordialis*. Novel characteristics of the widespread and variable species. *L. tumida* are described, including its gemmae and pseudo-perianths. It is suggested that the very rare *L. mcvicarii* of Inverness, Scotland is identical with *L. tumida* and may have been introduced from Tasmania.

UNTIL the publication of Scott (1985) no single guide was available to the hepatics of Victoria. The identification of specimens collected there required reference to a widely dispersed literature, or the treatments provided by Rodway (1916) of the Tasmanian species or those of NSW by Stephani and Watts (1914), (see also Cropper *et al* 1991).

Quite a few of the species occurring in both regions are not listed by Scott as occurring in Victoria. In addition, among the "missing" are some cosmopolitan "weedy" species which ought to occur in Victoria. One such is indeed recorded by Scott as having been found in East Gippsland. It is *Cololejeunea minutissima* (Sm.) Schiffner. This "aggressive epiphyte" (Schuster 1983: 590) occurs throughout the world as a series of closely related sub-species or species; its occurrence in the State could have been predicted as highly probable. Another (not yet recorded) is *Lejeunea flava* Sw., also regarded as a cryptogamic weed by Schuster (1983) who says that it (like *C. minutissima*) "tolerates salt spray and a considerable level of exposure to desiccation". It has been widely collected in NSW, often under the synonym *L. thymifolia* Nees. In Japan it occurs as a corticole in maritime locations in the warmer parts of that country (Mizutani 1961). According to Richards (1984: 1237) "it occurs in disturbed sites and may owe its cosmopolitan distribution to man". Another cosmopolitan species which could be found in Victoria is *Leptolejeunea elliptica* (L & L.) Steph. which occurs widely in Pacific countries to the north of Australia as well as in New Zealand.

This paper endeavours to rectify some of these lacunae in the flora of Victoria, also to restore *Microlejeunea primordialis*, which had been reduced

to *Lejeunea* by Scott without advancing any reason. I am reliably informed, by Dr J.H. Ross (see Acknowledgments) that there have been no additions to the Lejeuneaceae of Victoria since the publication of Dr. Scott's monograph in 1985.

Vouchers of all specimens cited will be lodged with the National Herbarium of Victoria

METHODS

Samples of the specimens were mounted, first in water, for microscopical examination, then in glycerin-jelly with the addition of a little toluidine blue; the dye stains the cell walls and is useful in enhancing visualisation of delicate structures.

Specimens were photographed using Kodak T400 film in a Nikon photomicroscope. Thin sections were cut with a diamond knife of materials embedded in White's No 25 resin. Preparations were also photographed using a Nikon Coolpix digital camera, the images enhanced by Photoshop Elements software and printed using a Photosmart or a Cannon S100SP printer. Drawings were made from photographic prints.

(1) *Lejeunea flava* Sw. *Flora Indica occid.* p. 444.
L. thymifolia Nees. *Syn. Hep.* p. 372.

The following description is based on a specimen collected by myself and Mrs Carr (Carr and Carr 457) in April 1957 on a gully at Mait's Rest, near Apollo Bay, on Hordern Vale Road, Victoria, and another (Carr & Carr 3571) from the bark of a blackwood

tree near Tooronga, River, Noojee, Victoria.

Monoicous, creeping on the bark of *Hedycarya* and *Acacia melanoxylon* in association with mosses, and the liverworts *Frullania c.f. rostrata* and *Metzgeria c.f. densisetata*. In thin flat, yellowish-green patches. Stems up to 12 mm long, irregularly, but not pinnately branched. Leaves contiguous and patent, overlapping a little, divergent, the antical lobe somewhat convex, oblong to oval, 210 μm long, bluntly rounded at the apex, the margin entire, attached to the outer cortical merones of the stem, the base not overlapping it. At the leaf tip, it is bordered by small cells (14 μm wide) with another row of small cells, sometimes incomplete, within it followed by one or two parallel longitudinal rows of larger cells (up to 23 μm wide). The postical lobe not large, c. 80-100 μm long, 70 μm wide, strongly convex, the keel

arched strongly and decurrent into the ventral part of the antical lobe. The basipetal edge of the antical lobe and the keel of the postical lobe meet in a deep sinus. The free margin of the postical lobe involute except at the apex, with a tooth, consisting of a single projecting cell, very close to the apex. Cells uniformly thin walled but with very small trigones (Fig. 4A) No ocelli. Oil bodies numerous, 8-25 per cell, very small, round, elliptical or vermiform. Underleaves orbicular, bifid, 220 μm long and the same in width i.e. about four times as wide as the stem (which is 50 μm wide), the margin entire (Fig. 1E). Sinus narrow, at a depth of 40% of the length of the underleaf, the acute to obtuse lobes not divergent, each tapering to a tip consisting of one or two cells. The base of the underleaf subcordate. The stem section shows 7 cortical cell rows surrounding 23 rows of much smaller medullary cell rows i.e. twice as many as in the Japanese specimens according to Mizutani (*loc. cit.*). Rhizoids not scarce (cf. Mizutani,) sometimes forming "attachment organs" (Haftorgane) each consisting of the expanded tips of a fascicle of rhizoids. Perianth pyriform 0.8 mm long, 0.5 mm wide terminating a short lateral, succeeded by one or two innovations (Fig. 1F). The beak short, consisting of groups, each about six cells. The ventral and lateral keels not prominent but extending more than half the length. The involueral leaves ovate-aeminate, 55 μm long, the bracteole similar to the stem underleaves. Antheridia two to four on short lateral branches with two to six bracts, which are smaller than the leaves. The seta of the capsule very short, the c. 16 elaters each 200 μm long with expanded tips, colourless, contorted, attached near the tips of the four valves, lacking internal spiral thickenings. The spores oval, 25 μm wide, the extine finely punctate.

Comment. The leaves of specimens from Killamey, Ireland are reported by MeVicar (1926: 429) to be "occasionally shiny when dry". Certainly the Victorian plants do glisten when specimens are viewed in the dissecting microscope. This can be attributed perhaps to the large number of small oil bodies in each cell, or more likely to some light-reflecting property of the cell-walls since other species of *Lejunea* with similar or even greater numbers of small oil bodies, e.g. *L. sublobata*, lack the shininess of *L. flava*. The result is to lend a rather golden iridescence to the appearance of the dry plant seen under a lens. It vanishes as soon as the plant is moistened, to be replaced by semi-translucency. Mizutani (1962: 200)

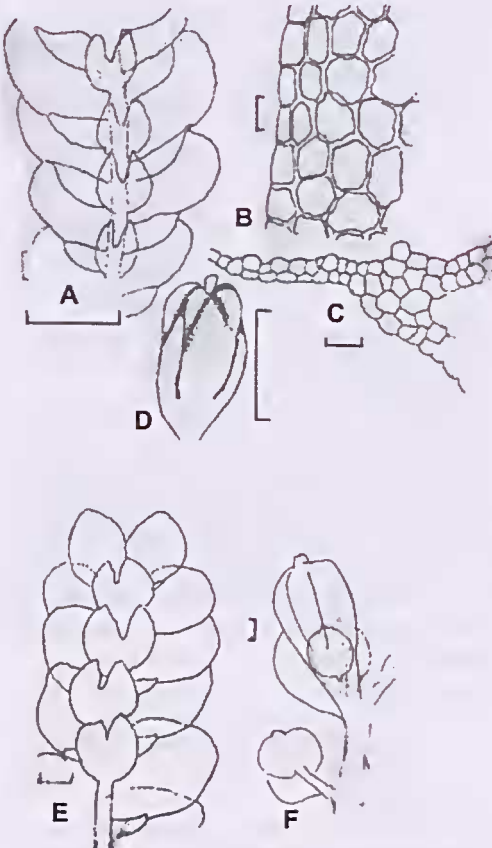


Fig. 1. A-D, *L. cavifolia*. A. Portion of shoot. B. Cells near the edge of the leaf. C. Part of lobule with tooth. D. Perianth; E-F, *L. flava*. E. part of shoot. F. Perianth. Scale bars A, E & F, 100 μm . B & C, 10 μm . D, 1 mm.

does not refer to this phenomenon in relation to the Japanese specimens.

(2) *Lejeunea cavifolia*. (Ehr.) Lindb. *Acta. bot. Soc. Femica* 1871: 43.

L. serpyllifolia, Libert, *Ann Gen Sci Phys*, 6, 1820: 374.

The following description is drawn up on the basis of a specimen collected by Mrs Carr and myself (Carr & Carr 255) at Lorne, Victoria, February 1955. Another specimen was collected February 1956 growing on tree branches in a beech gully at Beenak Victoria, (Carr & Carr 2562) together with *Radula buccinifera* and *Harpalejeunea laetitans*. Yet a third (Carr & Carr 1562) was collected on a fern gully in the Otway Ranges Victoria, epiphytic on large clumps of the moss *Ptychomnium aciculare*.

In dense, flat, dull olive-green patches on the bark of trees, stems 12-20mm long irregularly branched, the branches spreading widely to form plants almost as wide as long (Fig. 6E). Leaves very closely imbricate, (hence the synonym, from Latin *serpyllum*, wild thyme) patent, inserted at about 60 degrees to the stem (Fig. 1A), somewhat concave, ovate, 235µm long 130µm wide, rounded, or more rarely subacute at the apex, margin entire. The plants from Beenak had the leaves inserted at angles of 20-30 degrees to the stem, and were more closely imbricate and crowded giving the long stems a julaceous appearance.

The acropetal margin in antical view widely overlapping the stem. Leaf bordered by small cells each 12 µm wide (Fig. 1B). Cells becoming larger with distance from the margin, 25µm near the margin to 30µm in the centre of the leaf (Fig. 4B). Oil bodies small, numerous, ovoid to fusiform, 7-25 per cell. Cell walls uniformly thin, no or only minute trigones.

Postical lobe small, (Fig. 1A & 1C) 250 µm long, 100 µm wide, inflated, the free margin involute except near the apex, with a single blunt 1-celled tooth.

Underleaves large, (Fig. 1A) overlapping, 300 µm long and the same in width, three to four times as wide as the stem, bifid to one half the length, sinus obtuse, the lobes wide, somewhat divergent tapering to a single cell at the tip.

Perianth terminating a short lateral, 1.5 mm long, 0.5 mm wide, succeeded by an innovation from the same branch. Ventral and lateral keels well-developed, extending to half the length of the perianth. The upper parts of the keels are crested (Fig. 1D) and sometimes minutely papillose. The crests in Carr & Carr 1562, in which the perianth terminates a main stem followed

by an innovation which also bears perianths, extend to half the length of the perianth. The crests are readily seen on the dry specimen, forming a structure like a minute biretta crowning the perianth. Perichaetial bracts 0.6 mm long, tips obtuse-acute, bracteole shortly bifid with acute lobes, 400 µm wide, 400 µm long.

Elaters of capsule, twisted, colourless, devoid of inner spirals, 170 µm long, Spores oval, 25 µm long, extine punctate.

Antheridial branch very short, with a very thin, fragile stem and therefore easily detached, and often lost when preparing specimens for microscopy; perichaetial leaves cup-shaped, 4-6 per branch.

Comment. Since it occurs often as a minor component of epicortical brophyte consociations, this species must be the commonest of all the Lejeuneas of Victoria, contrary to Scott (1985) who reserves that epithet for *L. drummondii*. (Also very common is *Harpalejeunea laetitans*). The vigorous plants of Carr & Carr 1562 had many perianths, often 4-6 per stem (Fig. 3E). The crested keels resemble closely those depicted by McVicar (1926: 430). Plants with large underleaves, larger than the postical lobe, were included by Lindbergh in his species *L. planiuscula* (Lindb.) Bueh. = *L. lamacerina*, auct. plur. but *planiuscula* differs from *cavifolia* in having composite oil bodies which disappear quickly after collection. Our specimens have large underleaves but numerous single but persistent oil bodies. They must therefore be retained in *L. cavifolia*.

(3) *Microlejeunea primordialis* (Tayl.) St.

In Scott (1985) as *Lejeunea primordialis* Gonsche. The following description is based on a specimen (5571) collected by Mrs Carr and myself in May 1957 growing on trees near Mason's Creek Falls, at Kinglake National Park, Victoria, in dense dark-green patches on tree bark together with other bryophytes.

Plants 15 mm long by 7 mm wide, glistening when dry (cf. *L. flava*) Leaves ovate, 135 µm long by 95 µm wide, imbricate, (Fig. 5A) overlapping the stem in antical view, bordered by two or three cell rows parallel to the leaf edge. The cells of the outermost row small, 15 µm wide, cells increasing in size away from the edge to 25 µm near the base (Fig. 5E). Cells with trigones and thickenings to the mid-walls. Oil bodies colourless, small, 10-20 per cell,

rod-shaped, fusiform or vermiform.

Postical lobes 175 μm long, 120 μm wide, inflated, the keel strongly curved, the free margin involute except near the apex where the free edge curves sharply to meet the basipetal edge of the antical lobe in a deep sinus. There is a single blunt tooth, consisting of one or two cells about midway along the free edge. Underleaves relatively large with a semicordate base, oval, 300 μm wide 220 μm long, bifid, the sinus narrow at about one third to one half the length, the lobes not divergent, obtuse at the base but ending in an acute tip. Stem 90 μm wide, of three rows of cortical cells in antical view (Fig. 6B). In section, (Fig. 6B) the stem shows three rows of medullary cells, as large as or almost as large as, the cortical cells an important feature of the subgenus *Microlejeunea* (Schuster, 1962:1). Antheridial branches sometimes paired, very short, with 6 bowl-shaped bracts, antheridia about 6.

Perianth terminal on a short branch (Fig. 5A), with an innovation from the main stem, 0.9 mm long by 0.4 mm wide, the beak 45 μm long. The keels strongly developed, crested near the apex, there somewhat papillose. Perichaetial bracts less than half the length of the perichaetium, bracteole oval, very shortly bifid. Capsule with a very short seta, elaters colourless with a vestigial internal spiral, spores not seen.

Comment. Scott (1985) chose to follow Gottsche in reducing this species from *Microlejeunea* to *Lejeunea*. I now propose its reinstatement in an *Umtaufung* (re-baptism) to use a term which has been used before in the bryological literature, having provided as full a description as I am able instead of Scott's (*loc. cit.*: 237) merely "a minute version of *L. drummondii*". It is a much larger plant than that described by Scott ("0.5mm wide"). Arguments for retaining the subgenus *Microlejeunea* are canvassed in a previous manuscript (Carr 2002) in describing a new species. According to Schuster (1963: 248) the species redescribed by Stephani (1912-1917) from material from "Auckland Islands, New Zealand", is identical with *M. aneklandica* St. from the same locality. The illustrations in his unpublished *Icones* show one aberrant plant (called by him "*forma etiolata*") which differs considerably from those of the perhaps better developed Australian material (Fig. 6A). The leaves are shown as remote from each other on the stem, not overlapping (although in addition one, presumably "normal" stem is shown with overlapping, imbricate leaves). Microphyllous stems with remote leaves can

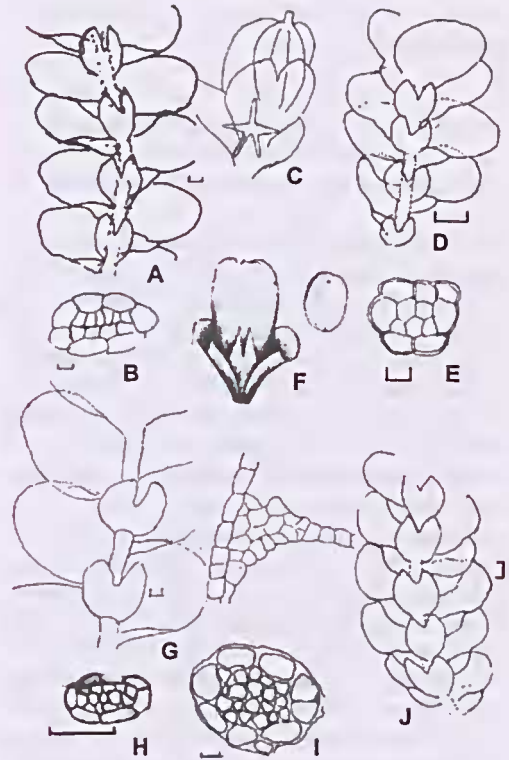


Fig. 2. A-C. *L. tasmanica*. A, part of shoot. B, stem section. C, perianth, b=bract, k=large flattened keel. Arrow = cross section of perianth. D-F. *L. tumida* D, part of shoot. E, cross section of stem. F, perianth and its cross section (from Bastow, 1887) (Note the presence of a small beak but no keels). G-I. *L. sublobata*. G, part of shoot. H, cross section of stem. I, proximal part of lobule showing position of the tooth on lobule. J-K. *L. fawcettiae*. J, part of shoot, K, cross section of stem
Scale bars. D, 100 μm . E, 10 μm . F-K, 100 μm .

be found in Australian specimens but they are atypical. The underleaves drawn by Stephani differ from those here described, but he does show one which has a sub-cordate base. The tooth on the lobule agrees (Fig. 6C), but not the papulosity of its keel (*vide* Stephani), and so do the strong keels of the perianth and the perichaetial bracts and bracteole, but he does not show the crests of the keels. His description (and illustration) has *M. primordialis* with smaller cells than described here, without trigones and without wall thickenings but *M. aneklandica* with relatively large trigones. Clearly the matter requires a critical comparison of material from both New Zealand and Australia for a complete resolution.

(4). *Lejeunea tumida*, Mitten in Hooker
Journal of the Antarct. Voyage vol 2.

Flora Nov. Zel. 2, 157. Pl. CIII.

Schuster (1963: 249-251) has suggested using this species to typify a new subgenus, *Sphaerocolea* and provides not only a brief Latin protologue but a full description in English. He describes it as a "small, but rather variable species". The following description is of a specimen (Carr and Carr 5572) collected by Mrs Carr and myself in April 1957 growing on trees at a gully at Delley's Dell, The Grampians, Victoria. It has been matched with a NSW specimen determined by Stephani in *Herb. E. Levier*.

Small delicate plants growing among other bryophytes, especially *Papillaria* sp. and *Metzgeria* sp. on the bark of trees. In small, yellowish-green patches, stems 10mm. long often in parallel groups ("fastigiate" - Schuster's term *loc. cit.*) (Fig. 6F), irregularly branched, the branches widely spreading. Leaves not remote, contiguous to somewhat imbricate, suberect to obliquely spreading or patent. The stem in cross section has 7 rows of cortical cells and 5-6 rows of medullary cells. (Fig. 2E). Leaves asymmetric (Fig. 2D), ovate-falcate, concave towards the stem, 125 μ m long 75 μ m wide, in antical view only just overlapping the stem which is 60 μ m wide, leaf cells 21-25 μ m diameter, (Fig. 4D) roughly polygonal with thin cell walls and very small trigones. Leaf bordered by a single row of smaller cells 18 μ m wide, leaves without ocelli. The leaf apex rounded, obtuse. Oil bodies very small, colourless, oval or round. The leaves of the NSW specimen are smaller, 100 x 75 μ m. [The leaves of the specimens (from North Island, New Zealand) described by Schuster (1963) were as large as 875 μ m long!] and the cells of the leaf centre smaller, only 9 μ m wide with fewer oil bodies than the Victorian specimen. Nevertheless, both have cells which are unusual in shape - irregular rectangles or polygons (+ or - hexagons. *vide* Schuster *loc. cit.*), thickened at the angles ("collenchymatous" *vide* Schuster) almost the same in length as in width. Postical lobe very inflated, half as long as the antical lobe, 175 μ m wide the free margin strongly involute except near the apex, keel very strongly convex, at the apex ending in a long, deep sinus as it joins the basipetal edge of the antical lobe. The concavity of the antical lobe causes a twist in the leaf where it meets the oppositely inflated lobule at its apex; a one or two-celled hyaline tooth (always two-celled in Schuster's specimens) projects from the free edge of the lobule near the apex. Sometimes the tooth cell is narrow and resembles a finger. Underleaves quite round, 325 μ m x 325 μ m [in Schuster's specimens,

relatively small, and somewhat oval (160-210 x 165-180 μ m) 62 x 55 μ m in the NSW specimen] i.e. four to four and a half times the width of the stem, bilobed, sinus rounded, situated at about one half the length, lobes about eight cells wide at the base, tapering gradually to one or two cells at the acute tip. Rhizoids frequent. The NSW specimen has numerous discoid gemmae, borne in the postical lobes of the younger leaves; the Victorian specimen has them, also but only on the older parts of the plant (Fig. 3B) (the Schuster specimens from New Zealand lacked gemmae). The stem section shows eight cortical cell rows and 10 rows of smaller medullary cells.

Fertile perianth terminating a short lateral branch (Fig. 3C), with an innovation from the same branch, 0.6 mm long, 0.4 mm wide, clavate, fig-shaped, apex rounded, with a short beak and without keels (Fig. 2F). The NSW specimen appears to have very short, small acropetal keels but this may be an artefact of drying. Perichaetial bracts much shorter than the perichaetium, oval-acute. The bracteole, 1.4 mm x 1.1 mm, i.e. more than three times as large as the underleaves.

Elaters of capsule colourless, without an internal spiral, tips expanded (Fig. 5C). Spores oval, elongate through pregermination division. Exine punctate.

Antheridial branch lateral, short, with 6 bowl-shaped bracteoles and 3 - 4 antheridia. The delicate leaves readily erode when old, the fragments possibly serving as vegetative propagules.

Comments. Schuster (1963: 251) states that this species is perhaps "allied to the plant described by Stephani (1914-19) as *Lejeunea globosiflora* from Chile "which judging from Stephani's diagnosis is even smaller". I propose to draw attention to the fact that the rare Scottish species, *L. mevicari* Pearson, which occurs only in one locality in western Scotland is perhaps identical with *L. tumida*. The descriptions of the two species given in Stephani (1914-18 Vol 5) are quite misleading. *L. tumida* is said to have a "5-plicate perianth with the postical keels narrow but decurrent, the antical keel strong but short". His drawing of a cross section of the perianth shows five prominent keels, which is at variance with all other authors. *L. mevicari* is described as "having no keels, but a strong beak". The perianths developed in *L. tumida* are of two kinds: the first infertile, has terminal lobes which are rounded, separate and entire and do not form a beak (Fig. 3A). The second kind, which is fertile, has five terminal lobes which each produce a

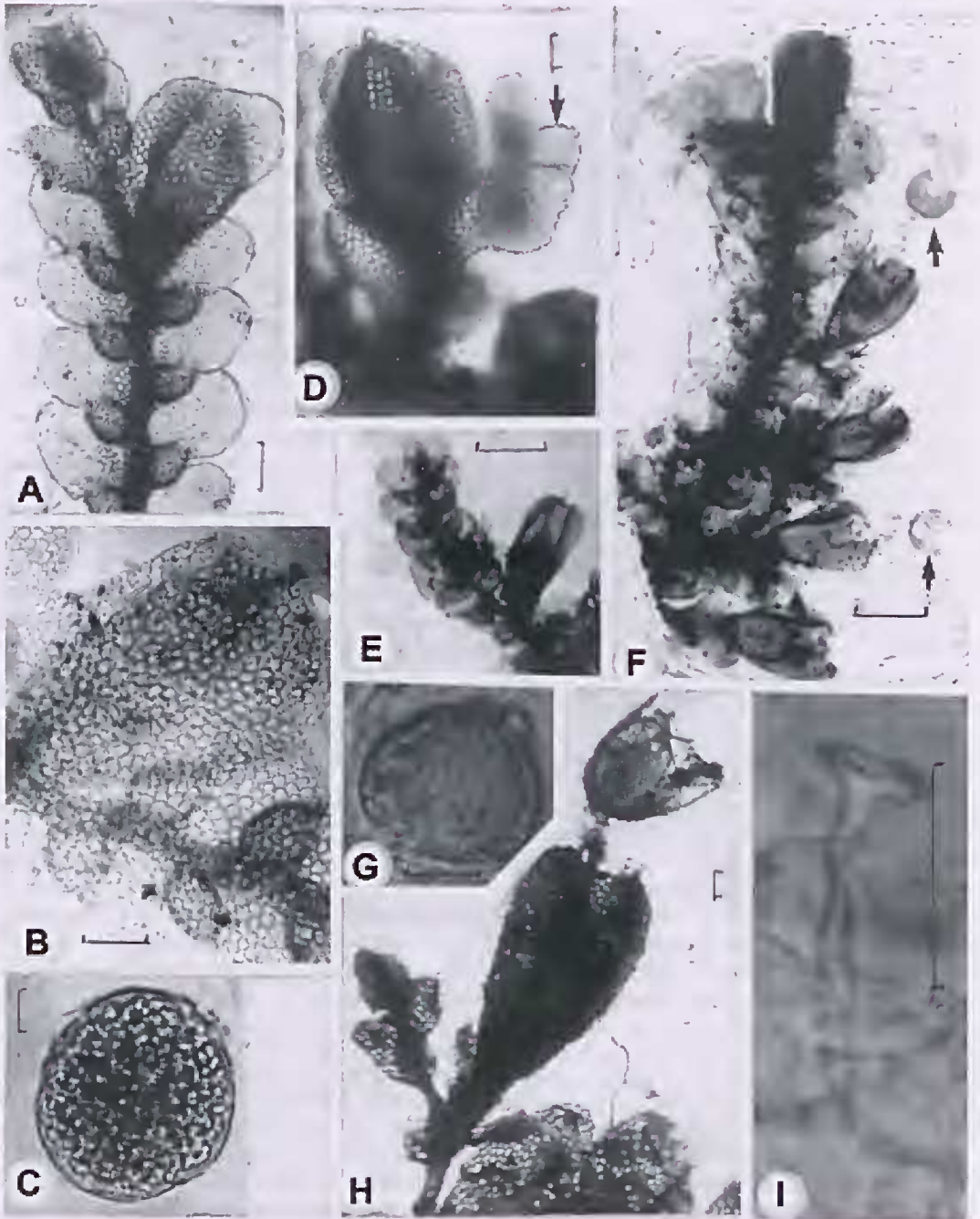


Fig. 3. Reproductive structures. A-C, *L. tunida*. A, pseudo-perianth (beakless) B, fertile perianth (arrow=beak). C, Gemma; D, *L. tasmanica*, Perianth with innovation (arrow). E-G, *L. fawcettiae*. E, perianth. F, shoot, terminated by perianth and with four seriate perianths terminating laterals, two of which have mature capsules (arrows). G, spore. I, clater. H, *L. subelobata*. perianth with innovation (In)
Scale bar=100 μ m
Scale bars. A - F = 100 μ m, G = 10 μ m, I = 100 μ m.

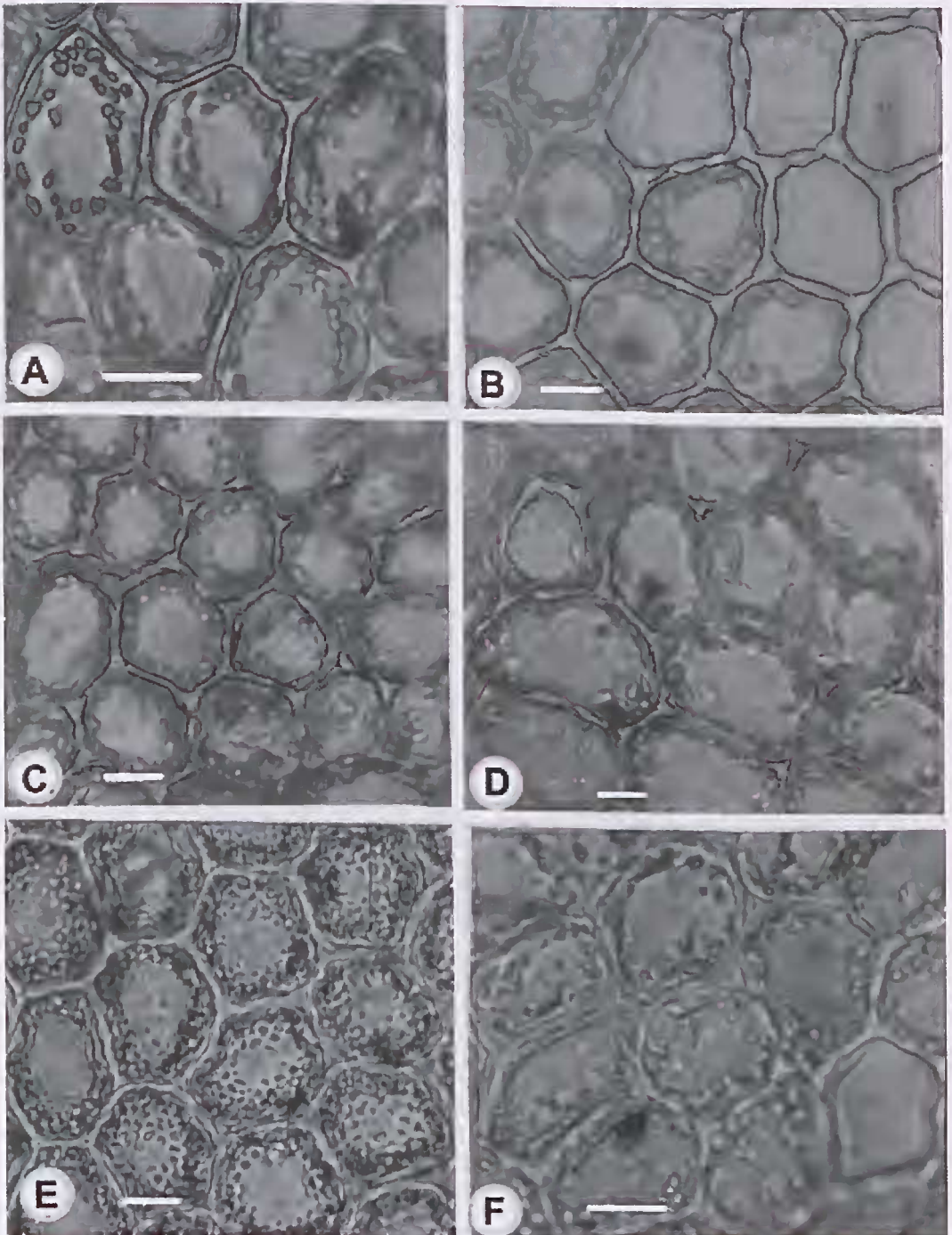


Fig. 4. Cells of the centre of the leaf. A. *L. flava*. B. *L. cavifolia*. C. *L. tasmanica*. D. *L. tunida*. E. *L. sublobata*. F. *L. fawcettiae*. Each scale bar = 10µm

central, emergent set of cells, which conjoin with those of the other lobes to form a short beak (Fig. 3B) (Schuster's specimen had a "long slender beak" but no keels). The lobes are free only to about a quarter of their length. Both kinds of perianth were present on both the NSW and the Victorian specimens. The infertile, perianths or pseudo-perianths are referred to as "tube organs" by Goebel (1915-18, Vol 2:717). Goebel (*loc.cit.*: 718) records the same phenomenon in other liverworts (e.g. *Physotium giganteum*). The infertile perianth ("pseudo-perianth") is not followed by the production of an innovation. Since the beak is the product of apical meristem activity which fades soon after leaf initiation (Bopp & Feger, 1961), the formation of the beak on the perianth lobes (leaf equivalents) is probably contemporaneous with the initiation of the archegonium at the stem apex. This explains why the pseudo-perianth lacks both beak and archegonium.

The description of *L. uexvicari* in McVicar (1924) agrees in all major particulars with that of *L. tunida* although infertile perianths and gemmae are not mentioned, perhaps through lack of intensive study of this very rare species. Rodway (1916) clearly describes and illustrates the keel-less nature of the perianth in *L. tunida*. Clearly the species is very variable and deserves further study over its whole range in the same way that was done by Schuster (1962) for *Mierolejeunea ulicina*. In all probability, in my opinion, the species, which is widespread in Tasmania, has been spread by the unwitting activity of man to a site in Inverness. The comparatively late (1900) discovery of *L. mevicari* is in agreement, together with the remarkable apparent identity of the two species. Schuster (1983: 612-3) refers to the inadvertent and successful introduction of antipodal bryophytes to Britain, for instance, the moss "*Orthotrichum lineare Schwaegr.* which was introduced, apparently from the Southern Hemisphere where it is indigenous, to the Liverpool district around 1911 and rapidly spread throughout Britain". Similarly he continues, "*Caupylopus introflexus*, indigenous to the Southern Hemisphere has been introduced into Western Europe and since 1941, has spread explosively throughout the British Isles Subsequent to their introduction these species have been confused with species native to Britain or Europe". These mosses are much more aggressive colonists than *L. tunida* which if it is indeed identical with *L. mevicari* does not seem to have spread from its original Scottish locality following discovery.

Another species which could well be placed in

Sphaeroocolea is the New Zealand *Taxilejeunea colensoana* St., which Schuster (1963: 251) suggests should be placed in *Lejeunea s. lat.* and (Schuster 1963: 250) regards as a synonym of *L. tunida*. It has the massively inflated lobules and keelless perianths of the other two species. Schuster perhaps wrongly accuses Stephani (*loc. cit.*: 250) of placing *tunida* in *Taxilejeunea*. It is true that *colensoana* was tentatively placed there by Stephani, "on the basis of the diffuse gynocidia".

Scott's (1985) only comment on *L. tunida* is to the effect that the (presumably Victorian) records of it "are probably mostly *L. drummondii*". If this is correct it is a sad reflection on the abilities of previous hepaticologists of Victoria.

(5). *Lejeunea subelobata* Carr & Pears, 1887.
Linn. Soc NSW, 1439.

The following description is based on a specimen (Carr and Carr 3571) collected by Mrs Carr and myself, March 1957. It was growing on a rock at water level in the Toorong River near Noojee, Victoria. Another specimen (not numbered and now lost) was epiphytic on a moss, *Weymouthia cochlearifolia* in a fern gully at Kallista. They have been compared with specimens from NSW, verified by Stephani. The NSW specimens are frequently mixed with another elobulate *Lejeunea* which appears to be *L. aloba* St. (Stephani, 1918, Vol 5: 767) from New Caledonia, which differs in the much smaller numbers of oil bodies per cell and in the much narrower underleaves with divergent, lanceolate lobes. The Victorian specimens do not have this admixture.

Plants growing in dense patches on wet rocks, pale green, stems to 10mm long, irregularly branched. Leaves closely imbricate, patent, somewhat concave, broadly ovate or spatulate (Fig. 2G), the apex rounded, the base narrowed to the median, 0.7mm. long x 0.5mm max. width, with a sloping and relatively narrow attachment to the stem, in antical view the aeropetal edge not crossing the stem. Despite its relatively wide oval shape the leaf is attached quite narrowly to the outermost merones of the stem both dorsally and ventrally. Postical lobe very small or absent, when well developed 200µm. long x 70µm. wide, with a blunt tooth near the apex (Fig. 2G). Cells of centre of leaf 20µm. in diameter, (Fig. 4E) roughly hexagonal with very small trigones, cell walls dark-coloured, uniformly thickened, minus mid-wall thickenings. Oil bodies minute, dark coloured, oval,

very numerous, 25-45 per cell, almost filling the lumen, so that the leaf lacks translucency (Fig. 4E). Cortical cells of stem 32 μm wide, with about 8 cortical cells, medullary cells narrower in five to six rows (Fig. 211). Underleaves large, about two and a half to three times the stem width, round or oval, with a subcordate base, diameter 350 μm , sinus about one fifth the depth, obtuse, the wide lobes not divergent, rounded at the tips. The stem section shows 8 rows of cortical cells and ten rows of relatively thick-walled medullary cells. Perianth terminating a lateral branch with a subsequent innovation from the main stem (Fig. 3G), small, pyriform, 0.5mm long, x 0.25mm wide, with a relatively long beak, 88 μm long. Keels of perianth extending to the full length. Perichaetial bracts about half as long as the perichaetium, bracteole oval, bifid, the lobes lanceolate. Capsule (Fig. 1, 8) with a fairly long, jointed seta, emerging at least 250 μm from the perianth, elaters about 200 μm long, without an inner spiral, tips not inflated. Spores 11-12 μm long, oval, extine minutely punctate.

Antheridia often in pairs on opposite sides of the stem, each on a very short branch, with two-three pairs of bracts.

(6) *L. tasmanica*. Gottsche, Linnaea, 1856.

This species is common in Tasmania and is also widespread in NSW.

The following description is based on a specimen (Carr & Carr 1563) collected by Mrs Carr and me, January 1956 from the bark of the ultimate branches of a small tree at Tom Tregellen's gully, Kallista, Victoria, and another, (Carr & Carr 4570), collected April 1957 on the floor of the fern gully at Delley's Dell, near Hall's Gap, the Grampians, Victoria with other bryophytes (*Bazzania* sp. and mosses).

Creeping, closely adpressed to the bark of smooth-barked trees, mixed with *Radula buccinifera* or admixed with other bryophytes in moist, cool situations. Mid green, stems to 20 mm length, irregularly branched. Leaves closely imbricate, ovate elliptical, 0.6mm by 0.4mm, spreading at an angle of between 90 and 60 degrees to the stem (Fig. 2A). Cells of the centre of the leaf 37.5 μm (Fig. 5C), cells bordering the margin 14 μm wide. There are four to five longitudinal rows of cells parallel to each of the margins of the leaf (Fig. 5B).

Cell walls uniformly thin without thickenings or trigones. Oil bodies homogeneous colourless, minute,

spherical to bacilliform, 4-10 per cell. Underleaves three times as wide as the stem, round, 0.2mm diameter, base subcordate, divided to half the length, sinus narrow, acute, lobes convergent, apiculate terminating in one or two cells. The underleaves increase in size acropetally, from 0.15mm diameter at the base of the stem.

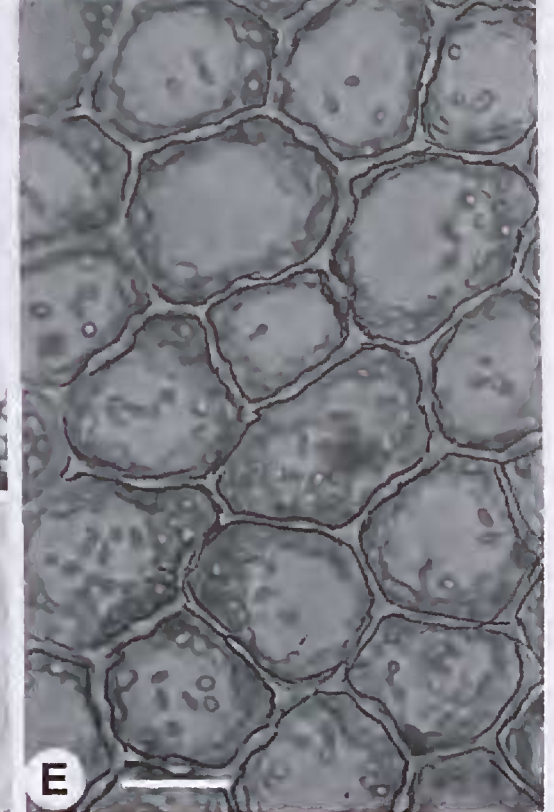
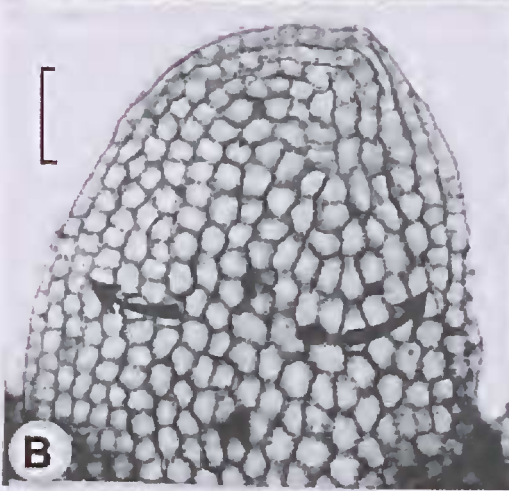
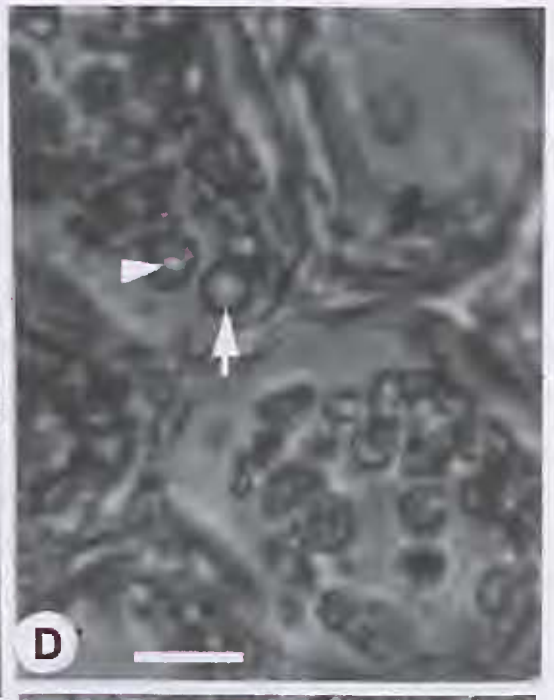
Postical lobe large, inflated, 125 μm long, 65 μm wide the free edge somewhat involute the one, or more usually, two-celled tooth very close to the apex turned towards the stem. The stem has the seven rows of cortical cells as is usual for *Lejeunea* species and about ten medullary cell rows (Fig. 2B).

Perianth terminating a short lateral followed by an innovation from the same branch (Fig. 3D) with four large bracts, each rounded at the tip and extending about three-quarters the length of the perianth, bracteole bifid, 210 μm long. Perianth 0.9mm long by 0.4mm wide with a short but well-marked beak and five prominent, strongly flattened keels which extend almost the full length (Fig. 2C). Antheridial branch a very short lateral with six bracts.

Comments. The regularity of the cellular construction of its leaves, consisting of a single row of narrow cells forming a border, inside which are nested four or five regular ellipses of larger cells, with the centre of the leaf consisting of almost linear rows of the largest cells running from the base towards the apex (Fig. 5B), is so unusual as to deserve an adjective: *campylocytic* analogous to the term for a similar type of Angiosperm leaf venation (see Carr, 2003). This feature, coupled with the absence of cell wall thickenings or trigones, the large mid-leaf cells and the small number of minute colourless oil bodies are features sufficiently distinctive as to make specimens of *L. tasmanica* easily distinguishable at a glance from all other Victorian *Lejeuneas* with oval leaves and round bifid underleaves. This and the distinctive features of the perianth with its large, wide flattened keels and large bracts and bracteole make this an easily identified species. The specimen described differs from that of the original description only in its smaller leaves and the antheridial branch having six rather than only one to two bracts.

(7) *Lejeunea fawcettiae*. D.J.Carr. *sp. nov.*

Holotype. The following description is based on the specimen (Carr, S.G.M. 357) collected by Mrs Carr



in March 1957 growing on the bark of a blackwood (*Acacia melanoxylon*) tree near the Railway Station, Tooronga Falls, Noojee, Victoria.

Another specimen was collected by both of us Jan. 1956 (Carr & Carr 1560) on tree branches in the Otways, Victoria.

In cortice cespitans alliis hepaticis consociata, pallide griseo-viridis, folia caulis contigua, valde concava symmetrica. Lobulus majuscula inflata. Amphigastria caulina majuscula ad caule quinque latiora, subrotunda ad 1/4 incisio biloba sinus recto. Perianthia in ramulo parvo terminalia repetitas (x5) seriata. Androecia sessilis, seriata.

In pale grey-green patches appressed to the substratum. Stems to 5mm long, branched, somewhat pinnately near the base of the stem, forming autoicous plants about 2-3mm wide. Leaves closely imbricate, concave, oval, 0.6mm long, 0.3mm wide, apex rounded, incurved, subobtusely (Fig. 2J). Cells of centre of leaf 35µm wide, roughly hexagonal (Fig. 4F). leaf bordered by a single row of cells each 15

µm wide. Cell walls thin, with small trigones and occasional small mid cell-wall thickenings. Oil bodies 10-30 per cell, minute, oval to polygonal (irregularly 5-6 sides), each oil body with a refractive spherical inclusion (Fig. 5D). Postal lobes strongly inflated 375 µm long x 345 µm wide. Keel strongly curved, terminating at the apex in a deep sinus where it meets the antical lobe, free edge more-or-less involute. Underleaves large, round or oval 0.5 mm in diameter. (i.e. up to five times as wide as the stem) with a narrow sinus and not divergent lobes. Stem 100µm wide. Stem section shows 12 rows of cortical cells and 24 medullary rows (Fig. 2J).

Perianths small (each 0.4 mm, x 0.2 mm) commonly borne in series on short branches (Figs 3E-F) on the lower part of the stem, each terminating a lateral branch. Occasionally a perianth terminates a main shoot (Fig. 3F). Keels strongly developed to about half way. Beak prominent, 20 µm long.

Antheridial branches lateral, short often several seriate on a single stem, (cf. perianths) (Fig. 6G) bracts rounded.

Elaters colourless, 150 µm long, (Fig. 3I) without an internal spiral; tips expanded.

Spores bluntly triangular or cardioid (Fig. 3G) due to precocious pregermination divisions, the extine covered with punctiform emergences arranged in a curvilinear pattern.

Comment. The species is named for its discoverer, my wife née S.G.M. Fawcett. Were the taxon *Taxilejeunea* to be resuscitated, perhaps as a subgenus of *Lejeunea*, following its suppression by Schuster (1963), for species with large bifid underleaves and seriate perianths, *L. fawcettiae* would be a candidate for inclusion in it.

ACKNOWLEDGMENTS

I am indebted to Professor B.E.S. Gunning, FRS, FAA., of RSBS, ANU, for encouragement and for arranging for cross-sections to be made of the stems of the specimens, and to Dr Sally Stowe, Electron Microscopy Unit, RSBS, for having these made. I also wish to thank Mrs Janette Lenz, Mrs Anne Catling and Mr. Roland Jahnke for their support and encouragement, as well as my former colleagues.

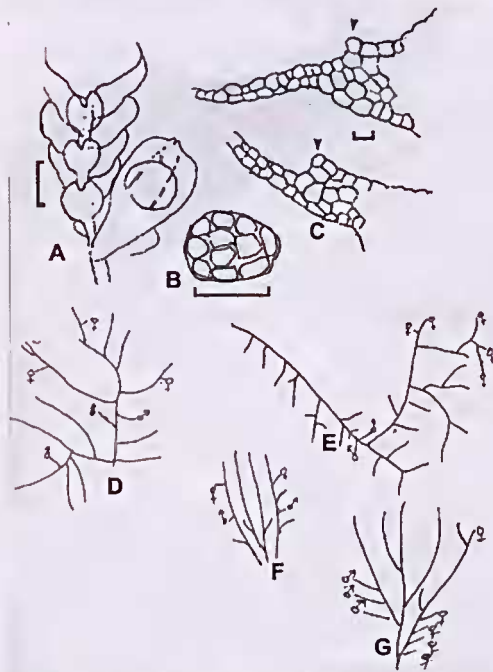


Fig. 6. A-D. *Microlejeunea primordialis*. A. Part of shoot with perianth. B. cross section of stem. C. lobules with teeth (arrows). D. Growth habit (schematic) Scale bars. A & B, 100µm. C, 10 µm. E-G. Growth habits of species of *Lejeunea* (schematic). E. *L. cavifolia* (from Carr & Carr, specimen 1562). F. *L. tumida*. G. *L. fawcettiae*

Fig. 5. Miscellany. A & E. *Microlejeunea primordialis*. A. Perianth. Scale bar = 100µm. B. *L. tasmanica*, campylocytic leaf. Arrows, several rows of longitudinal rows of cells, Scale bar = 100 µm. C. *L. tumida*. Spore and elaters. Scale bar = 10µm. D. *L. fawcettiae*. Heterogeneous oil bodies with inclusions (arrows), Scale bar = 10µm. E. *M. primordialis*, cells of centre of leaf. Scale bar = 10µm.

Professors Martin Canny, Margaret McCully and Adrian Gibbs for generous support and for supplies of materials for microscopy. Thanks are also due to Dr J. H. Ross, Chief Botanist, National Herbarium, Victoria for information supplied.

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Manuscript received

8 June 2003

Manuscript accepted

7 December 2003